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Report on the individual review of the annual submission of Hungary submitted in 2017*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2017 annual submission of Hungary, conducted by an expert review team in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol". The review took place from 4 to 9 September 2017.

* In the symbol for this document, 2017 refers to the year in which the inventory was submitted, not to the year of publication.

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Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A sources	source categories included in Annex A to the Kyoto Protocol
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
B_{BEFORE}	biomass before conversion
CEF-ne	newly established forest
CER	certified emission reduction
C_f	combustion factor
CFC	chlorofluorocarbon
CH_4	methane
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
EEA	European Environment Agency
EF	emission factor
EF_5	emission factor for N_2O emissions from N leaching and runoff
EMEP	European Monitoring and Evaluation Programme
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
F_{CR}	fraction of N in crop residues
FM	forest management
FMRL	forest management reference level
$Frac_{GASF}$	fraction of synthetic fertilizer N that volatilizes as NH_3 and NOx
$Frac_{GASM}$	fraction of livestock N excretion that volatilizes as NH_3 and NOx
$Frac_{GasMS}$	percentage of managed manure N for livestock category T that volatilizes as NH_3 and NOx in the manure management system
$Frac_{LEACH-(H)}$	fraction of all N added to or mineralized in managed soils in regions where leaching or runoff occurs that is lost through leaching and runoff
$Frac_{Remove}$	fraction of above-ground residues of crop removed
F_{SOM}	amount of N mineralized from loss in soil organic C in mineral soils through land-use change or management practices
G_{ef}	GHG-specific EF
Gg	gigagram
GHG	greenhouse gas
GM	grazing land management
ha	hectare
HCFC	hydrochlorofluorocarbon
HFCs	hydrofluorocarbons

HWP	harvested wood products
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
kha	kilohectare
KP-LULUCF activities	LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
Kyoto Protocol Supplement	*2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*
LULUCF	land use, land-use change and forestry
M_B	mass of fuel available for combustion
MCF	methane conversion factor
MSW	municipal solid waste
N	nitrogen
NA	not applicable
NE	not estimated
NF_3	nitrogen trifluoride
NH_3	ammonia
NIR	national inventory report
N_2O	nitrous oxide
NO	not occurring
NOx	nitrogen oxides
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF_6	sulfur hexafluoride
SOM	soil organic matter
SWDS	solid waste disposal site
t	tonne
TJ	terajoule
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
WDR	wetland drainage and rewetting
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

I. Introduction[1]

1. This report covers the review of the 2017 annual submission of Hungary organized by the secretariat, in accordance with the Article 8 review guidelines (decision 22/CMP.1, as revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (decision 13/CP.20). The review took place from 4 to 9 September 2017 and was coordinated by Ms. Kyoko Miwa (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Hungary.

Table 1
Composition of the expert review team that conducted the review of Hungary

Area of expertise	*Name*	*Party*
Generalist	Mr. Tomas Gustafsson	Sweden
	Ms. Elsa Hatanaka	Japan
Energy	Ms. Melanie Hobson	United Kingdom of Great Britain and Northern Ireland
	Ms. Lungile Manzini	South Africa
IPPU	Ms. Niculina Mihaela Balanescu	Romania
	Mr. David Kuntze	Germany
Agriculture	Ms. Marci Baranski	United States of America
	Mr. Bráulio Pikman	Brazil
	Mr. Juan José Rincón Cristóbal	Spain
LULUCF	Mr. Viorel Nelu Bellmondo Blujdea	Romania
	Mr. Atsushi Sato	Japan
Waste	Mr. Qingxian Gao	China
	Mr. Hans Oonk	Netherlands
Lead reviewers	Mr. Gao	
	Mr. Kuntze	

2. The basis of the findings in this report is the assessment by the ERT of the consistency of the Party's 2017 annual submission with the Article 8 review guidelines. The ERT has made recommendations that Hungary resolve the findings related to issues,[2] including issues designated as problems.[3] Other findings and, if applicable, encouragements of the ERT to Hungary to resolve them, are also included.

[1] At the time of publication of this report, Hungary had submitted its instrument of ratification of the Doha Amendment; however, the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

[2] Issues are defined in decision 13/CP.20, annex, paragraph 81.

[3] Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

3. A draft version of this report was communicated to the Government of Hungary, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

4. Annex I shows annual GHG emissions for Hungary, including totals excluding and including the LULUCF sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for Hungary.

5. Information to be included in the compilation and accounting database can be found in annex II.

II. Summary and general assessment of the 2017 annual submission

6. In accordance with paragraph 76 of the UNFCCC review guidelines and paragraphs 47 and 65 of the Article 8 review guidelines, the ERT has prioritized: the review of issues and/or problems identified in previous review reports or in the initial assessment; recalculations in the latest submission that have changed the emissions or removals estimate for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent for any of the recalculated years; and supplementary information reported under the Kyoto Protocol. Table 2 provides the assessment by the ERT of the annual submission with respect to the tasks undertaken during the desk review. Further information on the issues identified, as well as additional findings, may be found in tables 3, 5 and 6.

Table 2
Summary of review results and general assessment of the inventory of Hungary

Assessment				*Issue or problem ID#(s) in table 3, 5 and/or 6[a]*
Dates of submission	Original submission: 15 April 2017 (NIR), 15 April 2017 (CRF tables), 15 April 2017 (SEF-CP2-2016) Revised submissions: 26 May 2017 (NIR), 26 May 2017, version 2 and 23 October 2017, version 5 (CRF tables), 4 May 2017 (SEF-CP2-2016 and SEF-CP1-2016) Unless otherwise specified, the values from the latest submission are used in this report			
Review format	Desk review			
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	1. Have any issues been identified in the following areas:			
		(a) Identification of key categories	No	
		(b) Selection and use of methodologies and assumptions	Yes	E.2, E.4, I.4, I.12, L.9, L.14
		(c) Development and selection of EFs	Yes	E.10
		(d) Collection and selection of AD	Yes	I.7, I.8, I.10, I.13, I.14, I.15
		(e) Reporting of recalculations	Yes	W.6, W.7
		(f) Reporting of a consistent time series	Yes	E.4
		(g) Reporting of uncertainties, including methodologies	No	
		(h) QA/QC	QA/QC procedures were assessed in the context	

Assessment			*Issue or problem ID[a](s) in table 3, 5 and or 6[a]*
			of the national system (see para. 2 in this table)
	(i) Missing categories/completeness[b]	Yes	G.1, L.14, KL.6
	(j) Application of corrections to the inventory	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	No	L.7, L.14
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	2. Have any issues been identified related to the national system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	No	
	(b) Performance of the national system functions	No	
	3. Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry	No	
	(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, taking into consideration any findings or recommendations contained in the standard independent assessment report?	No	
	5. Have any issues been identified in matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party's activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, including any changes since the previous annual submission?	No	
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:		
	(a) Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.5
	(b) Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14	No	
	(c) Reporting requirements of decision 6/CMP.9	Yes	KL.6
	(d) Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7,	NA	

Assessment			*Issue or problem ID(s) in table 3, 5 and or 6[a]*
	annex, paragraphs 33 and 34		
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	Yes	
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No	
	Did the Party submit a revised estimate to replace a previously applied adjustment?	No	Party does not have a previously applied adjustment
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Question of implementation	Did the ERT list a question of implementation?	No	

[a] The ERT identified additional issues and/or problems in all sectors that are not listed in this table but are included in tables 3, 5 and/or 6.

[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex III.

III. Status of implementation of issues and/or problems raised in the previous review report

7. Table 3 compiles all the recommendations made in previous review reports that were included in the previous review report, published on 8 March 2017.[4] For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2017 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of Hungary

ID#	*Issue and or problem classification[a]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
General			
G.1	Annual submission (G.1, 2016) (G.1, 2015) (table 3, 2014)	Estimate and report the carbon stock changes and emissions/removals from all mandatory categories in the	Addressing. Hungary has estimated and reported emissions/removals for some of the missing categories (see ID# L.3 below). However, some mandatory

[4] FCCC/ARR/2016/HUN.

ID#	*Issue and/or problem classification[a]*	*Recommendation made in previous review report*	*ERT assessment and rationale*
	Completeness	LULUCF sector.	categories are still reported as "NE" in the LULUCF sector (see ID# L.7 in table 6).
G.2	QA/QC and verification (G.2, 2016) (G.2, 2015) (12, 2014) (16, 2013) Transparency	Include in the NIR all relevant information on QA activities carried out for the annual submission.	Not resolved. Information on QA procedures from internal agencies in Hungary has been included in the NIR, but it is not sufficiently transparent to enable the ERT to assess, for example, which QA activities are in place and how the results are taken into consideration in the improvement of the inventory. See ID# G.6 in table 6.
G.3	QA/QC and verification (G.3, 2016) (G.3, 2015) (12, 2014) Transparency	Include in the NIR a summary of the results of the QA activities carried out each year.	Not resolved. The QA procedures already implemented or planned have not been reported by the Party in accordance with the UNFCCC Annex I inventory reporting guidelines, paragraph 46, and the 2006 IPCC Guidelines (volume 1, chapter 6).
G.4	QA/QC and verification (4, 2016) (4, 2015) (13, 2014) Transparency	Revise the QA/QC plan in order to clearly distinguish between QC checks (e.g. LULUCF sector checks, EU completeness checks) and QA procedures.	Not resolved. The NIR does not clearly separate information on internal and external QA procedures (e.g. in the QA/QC plan provided in annex 5 to the NIR, pp. A66–69, the column "QA" still includes external QC checks). The ERT noted that no further information was provided in the 2017 submission.
G.5	Article 3, paragraph 14, of the Kyoto Protocol (G.6, 2016) (G.6, 2015) (95, 2014) (126, 2013) (148, 2012) Transparency	Report any change(s) in the information provided under Article 3, paragraph 14.	Resolved. The Party has reported in the 2017 NIR that no changes have occurred since the 2016 submission.
Energy			
E.1	Comparison with international data – all fuels – CO_2 (E.15, 2016) (E.15, 2015) Transparency	Include the data on additives in CRF table 1.A(b) for the entire time series.	Resolved. Data on additives are now included in CRF table 1.A(b) for the entire time series.
E.2	1.A. Fuel combustion – sectoral approach – liquid fuels – CO_2 CH_4 and N_2O (E.16, 2016) (E.16, 2015) Accuracy	Correctly estimate all emissions from all fuels used for off-road vehicles and other machinery and allocate them to the relevant categories, and use the notation key "IE" for all such categories and fuels whose emissions are included elsewhere; as a first step, apply the IPCC tier 1 methodology for gasoline, diesel and biofuels for subcategories 1.A.2.g.vii, 1.A.3.c.ii, 1.A.4.b.ii and 1.A.4.c.ii for all years, treating emissions from agriculture and forestry separately because different default EFs apply for	Addressing. The Party has used the tier 2 approach from the *EMEP/EEA air pollutant emission inventory guidebook 2016* (EEA, 2016) in the 2017 submission to estimate emissions from the subcategory other (1.A.2.g.vii) under the category manufacturing industries and construction and from the subcategory off-road vehicles and other machinery (1.A.4.c.ii) under the category agriculture/forestry/fishing under "other sectors". Emissions are allocated to be consistent with reporting to the UNECE Convention on Long Range Transboundary Air Pollution. The tier 1 methodology has been used to estimate emissions from the subcategory off-road vehicles and other

ID	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		machines using gasoline. If, as a result of the correct allocation of emissions as outlined above, non-CO_2 emissions from off-road vehicles becomes a key category, estimate and report these emissions by developing and implementing a higher-tier methodology, transparently describing the methodology used and any recalculations in the NIR.	machinery (1.A.4.b.ii) under the category residential.
E.3	1.A.3.a Domestic aviation – liquid fuels – CO_2, CH_4 and N_2O (E.13, 2016) (E.13, 2015) Transparency	Include in the NIR a description of the EUROCONTROL data, including its quality.	Resolved. Information on the EUROCONTROL data, including the methodology used by EUROCONTROL to develop data, is now included in the NIR (pp.67–68).
E.4	1.A.3.b Road transportation – all fuels – CH_4 and N_2O (E.14, 2016) (E.14, 2015) Consistency	Recalculate the non-CO_2 emissions from road transport using the same version of the COPERT model for the entire time series, while also resolving the remaining inconsistencies in the underlying databases.	Not resolved. Hungary explained in the NIR that the use of the new COPERT 5 model was considered to handle time-series calculations better than earlier versions; however, other problems (e.g. not allowing the inclusion of two-stroke vehicles in the calculations) were detected during its use. The ERT notes that, as a result, a recalculation of the non-CO_2 emissions from road transport using the same version of the COPERT model for the entire time series has not yet been performed. The ERT notes that the COPERT model can be supplemented manually with the emission estimates for two-stroke vehicles by using the fuel consumption value and EF from table 3.17 of the *EMEP/EEA air pollutant emission inventory guidebook 2016* (Part B: sectoral guidance chapters) (EEA, 2016).
E.5	1.B.2 Oil and natural gas and other energy production – liquid and gaseous fuels – CO_2, CH_4 and N_2O (E.12, 2016) (E.12, 2015) (31, 2014) Transparency	Improve the transparency of the NIR by further elaborating on the use of different data sources to estimate fugitive emissions.	Resolved. This information is now included in the NIR (p.81).
IPPU			
I.1	2. General (IPPU) – (I.1, 2016) (I.1, 2015) (36, 2014) Transparency	Provide more information on the reasons for, and methods used in, the recalculations.	Resolved. In the chapters on recalculations performed for the various subcategories in the NIR, Hungary has documented all changes.
I.2	2. General (IPPU) – (I.2, 2016) (I.2, 2015) (37, 2014) (58, 2013) (59, 2012)	Provide information on QA/QC procedures for all categories.	Resolved. Information on QA/QC procedures has been provided in the NIR, in each section of all subcategories.

ID#	Issue and or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	Transparency		
I.3	2.A.1 Cement production – CO_2 (I.9, 2016) (I.9, 2015) Transparency	Use a good practice data splicing technique given in the 2006 IPCC Guidelines (e.g. the overlap technique or surrogate data), as appropriate for Hungary's national circumstances, to fill data gaps in the time series of the CO_2 IEF for the period before 2005; recalculate CO_2 emissions based on the revised CO_2 IEF for that period; and include transparent information in the NIR on the estimation methodology.	Addressing. Hungary recalculated the emissions from cement production for the period between 1985 and 2004 using a country-specific method, which is almost comparable with the tier 3 approach. The ERT considers that the data gaps in the time series have been resolved based on the explanation provided by the Party during the review. However, The ERT notes that the methodology used by the Party is not provided in the NIR, although information has been provided in the 2017 submission to explain why the average IEF is not used.
I.4	2.A.4 Other process uses of carbonates – CO_2 (I.7, 2016) (I.7, 2015) (41, 2014) Accuracy	Carry out the planned investigation regarding the assumption underpinning the addition of 10 per cent to the data reported under the EU ETS for 2005 and onwards, as well as the use of the 10 per cent higher EF for the period 1985–2004 to account for bricks and ceramics manufacturers not included in the EU ETS and improve the estimates accordingly to ensure time-series consistency.	Addressing. In response to a question raised by the ERT during the review, Hungary explained that it has obtained preliminary results; however, the investigation has not yet been completed for the whole time series. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimation of emissions from this activity.
I.5	2.A.4 Other process uses of carbonates – CO_2 (I.10, 2016) (I. 10, 2015) Transparency	Provide information on exports of soda ash and an explanation of how it has been taken into account in the calculations to estimate emissions.	Resolved. Import and export data for the whole time series are available in table 4.3.6 of the NIR (p.111).
I.6	2.C.6 Zinc production – CO_2 (I.11, 2016) (I.11, 2015) Transparency	Use the appropriate notation key "NO" instead of "IE" for zinc production in the CRF table for the IPPU sector (2(I).A-Hs2) and clarify the nature of zinc production (i.e. primary or secondary) in the NIR.	Resolved. The notation key has been changed to "NO" and the Party explained in the NIR (p.139) that the last zinc mine was closed in 1985 and was flooded in 1986. Since then only zinc processing is occurring with fuel-related emissions.
I.7	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.8, 2016) (I.8, 2015) (42, 2014) (62, 2013) Accuracy	Make efforts to collect relevant data from companies and develop a country-specific value for recovery efficiency for refrigeration and air-conditioning equipment, and include all the information related to the estimation of disposal emissions in the NIR.	Addressing. In the NIR (p.147), Hungary reported that it has started to collect the relevant data. However, a country-specific value for recovery efficiency for refrigeration and air-conditioning equipment has not yet been developed, and not all information related to the estimation of disposal emissions is provided in the NIR.
I.8	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.12, 2016) Accuracy	Recalculate the F-gas emissions from refrigeration and air conditioning by replacing the extrapolated HFC and PFC AD for 2014 with actual data.	Not resolved. During the review, Hungary explained that the actual database for 2014 was not available. An interpolated value using the data of 2013 and 2015 was used for 2014, based on the method provided in the 2006 IPCC Guidelines (chapter 5.3.3.3).

ID[a]	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
Agriculture			
A.1	3. General (agriculture) – (A.1, 2016) (A.1, 2015) (46, 2014) (70, 71, 2013) Transparency	Report the animal numbers consistently in all NIR tables.	Resolved. Animal populations are reported consistently in the tables of the 2017 NIR.
A.2	3.B.1 Cattle – CH_4 (A.6, 2016) (A.6, 2015) Transparency	Report the correct value for the MCF for solid storage and dry lot manure management systems for non-dairy cattle in CRF table 3.B(a)s2.	Resolved. An MCF of 2 per cent was applied in CRF table 3.B(a)s2 for the entire time series.
A.3	3.C.1 Irrigated rice cultivation – CH_4 (A.7, 2016) (A.7, 2015) Transparency	Include the values of parameters used for calculating the EFs for irrigated rice cultivation in the NIR.	Resolved. Hungary has included the values of parameters in table 5.4.1 of the NIR.
A.4	3.D Direct and indirect N_2O emissions from agricultural soils– N_2O (A.8, 2016) (A.8, 2015) Transparency	Correct the typographical error in equation 5.3 of the NIR to include the term for F_{CR}.	Resolved. This typographical error in equation 5.3 has been corrected in the 2017 NIR.
A.5	3.D Direct and indirect N_2O emissions from agricultural soils – N_2O (A.9, 2016) (A.9, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Include the correct version of NIR table 5.5.1 that is consistent with CRF table 3.D.	Resolved. Table 5.5.1 of the 2017 NIR is consistent with CRF table 3.D.
A.6	3.D.a Direct N_2O emissions from managed soils – N_2O (A.10, 2016) (A.10, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Include the correct version of table 5.5.5 in the NIR.	Resolved. The values provided in table 5.5.8 (formerly table 5.5.5) of the NIR are correct.
A.7	3.D.a.2 Organic N fertilizers – N_2O (A.11, 2016) (A.11, 2015) Transparency	Use the correct notation key, "NE", in CRF table 3.D for emissions from the subcategory other organic fertilizers applied to soils (3.D.a.2.c).	Resolved. The Party has reported compost under the subcategory other organic fertilizers applied to soils and calculated the emissions for the whole time series.
A.8	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.12, 2016) (A.12, 2015) Transparency	Provide a robust rationale to demonstrate that the area of cultivated organic soil in Hungary is zero and/or explore ways to resolve this issue with FAO and European Commission Joint Research Centre.	Resolved. Hungary has provided additional evidence in the NIR (p.231) that lands classified as histosols by FAO are either under legal protection (not cultivated) or have lost carbon and therefore are not classified as histosols.
A.9	3.D.b.1 Atmospheric deposition – N_2O (A.13, 2016) (A.13, 2015) Transparency	Provide, in the NIR, more detailed information on the EMEP/EEA estimation methodology used to derive $Frac_{GASF}$ and $Frac_{GASM}$.	Resolved. The Party has provided satisfactory additional information on the estimation methodology, including the parameters and equations used, in the NIR

ID[a]	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
		including the parameters and equation used.	(see pp.234–238).
A.10	3.D.b.2 Nitrogen leaching and run-off – N_2O (A.14, 2016) (A.14, 2015) Transparency	Include the QA/QC process and verification information for the model used to classify areas into leaching and non-leaching areas (e.g. scientific papers or measurement data, comparison with other countries, comparison with other estimates such as those based on soil type and/or crop type) in the NIR.	Addressing. The Party has provi[4]:d QA/QC information on p.246 of the NIR. The Party did not include the annual amount of N in crop residues (F_{CR}) in the equation in the QA/QC section of the NIR for N_2O emissions from leaching/run-off from soil, but according to the response provided by the Party, F_{CR} was included in the calculations of indirect N_2O emissions from leaching/run-off.
A.11	3.G Liming – CO_2 (A.15, 2016) (A.15, 2015) Consistency	Provide in the NIR detailed information on: the different sources of AD used in the time series; the country-specific calculation methods used for deriving the missing AD for the period 1985–1999; and how the Party addressed the time-series consistency issues arising from the use of different sources of AD through the time series.	Resolved. The Party has satisfactorily revised its explanation on AD, including the different data sources, the methods used for deriving the missing AD throughout the time series, and its time-series reconciliation techniques (using the overlap method) (see NIR, section 5.8: Liming).
LULUCF			
L.1	4.C.1 Grassland remaining grassland – CO_2 (L.9, 2016) (L.9, 2015) (61, 2014) Accuracy	Develop country-specific values for the carbon stock changes in biomass under different conditions.	Resolved. Hungary applied a tier 1 assumption for biomass under grassland remaining grassland (i.e. the carbon stock change is zero), similarly to previous inventory submissions. However, the Party provided further information in the NIR (p.340) on a study conducted in 2016 and additional information during the review explaining that the change of grassland management, such as from non-set-aside grassland to set-aside grassland and vice versa, does not lead to a change in grassland productivity in biomass. In addition, the biomass pool for grassland remaining grassland is considered a non-key category component and applying a tier 1 method is consistent with the 2006 IPCC Guidelines.
L.2	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.10, 2016) (L.10, 2015) Transparency	Include graphs containing AD and data on emissions/removals for the whole inventory time series in the NIR, distinguishing (where relevant) the period before 2005 graphically and/or by providing suitable explanation in the NIR text and figure legends.	Resolved. Hungary provided AD and data for the period before 2005 in graphs with shaded areas to distinguish that period and provided a full explanation in the section on LULUCF in the NIR.
L.3	4.A.2 Land converted to forest land – CO_2 (L.11, 2016) L.(11, 2015) Completeness	Develop tier 1 estimates of changes in the carbon stocks in litter pool in cropland converted to forest land, grassland converted to forest land	Resolved. Estimates of changes in the carbon stocks in the litter pool in cropland converted to forest land, grassland converted to forest land and settlements

ID[a]	Issue and or problem classification[b]	Recommendation made in previous review report	ERT assessment and rationale
		and settlements converted to forest land using the default values of litter stocks provided in the 2006 IPCC Guidelines and report these in the NIR.	converted to forest land were esimated and reported in CRF table 4.A and in the NIR (p.320).
Waste			
W.1	5.A.1 Managed waste disposal sites – CH_4 (W.5, 2016) (W.5, 2015) Transparency	Add information on biogas production (e.g. by adding a column in table 7.2.4) in the NIR.	Resolved. Hungary has added a new table in the 2017 NIR (table 7.2.4) to provide data on the annual quantity of biogas flared (2001–2015) and biogas utilization (2005–2015).
W.2	5.C.1 Waste incineration – CH_4 and N_2O (W.6, 2016) (W.6, 2015) Transparency	Provide detailed and transparent information on the derivation of the carbon content and the non-CO_2 EF for waste incineration.	Resolved. Hungary has provided the derivation of the carbon content and the non-CO_2 EFs for waste incinerated in the NIR (table 7.4.2).
W.3	5.D Wastewater treatment and discharge – CH_4 (W.7, 2016) (W.7, 2015) Transparency	Improve the transparency of the description of the calculation for CH_4 recovery in the NIR by including an explanation on the amount of CH_4 flared and by adding a new column for CH_4 recovery from biogas production.	Addressing. Hungary has added the amount of CH_4 flared to CRF table 5.D; however, the description of the calculation for CH_4 recovery in the NIR has not been improved.
W.4	5.D.1 Domestic wastewater – N_2O (W.8, 2016) (W.8, 2015) Transparency	Provide correct values of N_2O emissions from domestic wastewater in table 7.5.4 in the NIR, consistent with the values reported in CRF table 5.D.	Resolved. In the NIR, Hungary has provided updated values in table 7.5.3 which are consistent with the values provided in CRF table 5.D.
W.5	5.D.1 Domestic wastewater – CH_4 (W.9, 2016) (W.9, 2015) Transparency	Include the share (per cent) of untreated wastewater in table 7.5.3 of the NIR.	Not resolved. In table 7.5.3 of the 2017 NIR, the share of domestic wastewater treatment does not include the share of untreated wastewater, and therefore the percentages provided do not add up to 100 per cent of wastewater produced.
KP-LULUCF			
KL.1	N_2O emissions from N mineralization/ immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils – N_2O (KL.4, 2016) (KL.4, 2015) Accuracy	Provide the correct values for the area under deforestation activity and N_2O emissions in CRF table 4(KP-II)3.	Resolved. The correct values were reported in CRF tables 4(KP-I)A.2 and 4(KP-II)3.
KL.2	N_2O emissions from N mineralization/ immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils – N_2O	Introduce a QA/QC procedure to check that areas are reported consistently across CRF tables to avoid such issues in the future.	Resolved. The areas were reported consistently across the CRF tables suggesting that a QA/QC procedure has been introduced.

ID[a]	Issue and/or problem classification[a]	Recommendation made in previous review report	ERT assessment and rationale
	(KL.4, 2016) (KL.4, 2015) Accuracy		

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue and/or problem was raised. Issues are identified in accordance with paragraphs 80–83 of the UNFCCC review guidelines and classified as per paragraph 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with paragraph 69 of the Article 8 review guidelines, in conjunction with decision 4/CMP.11.

IV. Issues identified in three successive reviews and not addressed by the Party

8. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2017 annual submission of Hungary, and have not been addressed by the Party.

Table 4
Issues identified in three successive reviews and not addressed by Hungary

ID[a]	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[b]
General		
G.1	Estimate and report the carbon stock changes and emissions/removals from all mandatory categories in the LULUCF sector	3 (2014–2017)
G.2	Include in the NIR all relevant information on QA activities carried out for the annual submission	4 (2013–2017)
G.3	Include in the NIR a summary of the results of the QA activities carried out each year	3 (2014–2017)
G.4	Revise the QA/QC plan in order to clearly distinguish between QC checks (e.g. LULUCF sector checks, EU completeness checks) and QA procedures	3 (2014–2017)
Energy		
	No such issues for the energy sector were identified	
IPPU		
I.4	Carry out the planned investigation regarding the assumption underpinning the addition of 10% to the data reported under the EU ETS for 2005 and onward, as well as the use of the 10% higher EF for the period 1985–2004 to account for bricks and ceramics manufacturers not included in the EU ETS, and improve the estimates accordingly to ensure time-series consistency	3 (2014–2017)
I.7	Make efforts to collect relevant data from companies and develop a country-specific value for recovery efficiency for refrigeration and air-conditioning equipment, and include all the information related to the estimation of disposal emissions in the NIR	4 (2013–2016)

ID[a]	*Previous recommendation for the issue identified*	*Number of successive reviews issue not addressed*[a]
Agriculture		
	No such issues for the agriculture sector were identified	
LULUCF		
	No such issues for the LULUCF sector were identified	
Waste		
	No such issues for the waste sector were identified	
KP-LULUCF		
	No such issues for KP-LULUCF activities were identified	

[a] The review of the 2016 annual submission was held in conjunction with the review of the 2015 annual submission. Since the reviews of the 2015 and 2016 annual submissions were not "successive" reviews, but were held in conjunction, for the purpose of counting successive years in table 4, 2015/2016 are considered as one year.

V. Additional findings made during the 2017 individual inventory review

9. Tables 5 and 6 contain findings made by the ERT during the individual review of the 2017 annual submission of Hungary that are additional to those identified in table 3. In accordance with paragraph 76(b) of the UNFCCC review guidelines, the ERT has prioritized in table 5 recalculations that changed the total emissions/removals for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent for any of the recalculated years.

Table 5
Additional findings made during the 2017 individual review of the annual submission of Hungary related to recalculations

ID[a]	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and or a problem?[b] If yes, classify by type*
Energy			
E.6	1. General (energy sector)	Recalculations were made to the energy sector that changed the emission/removal estimate for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	Not an issue/problem
IPPU			
I.9	2. General (IPPU)	Recalculations were made to the IPPU sector that changed the emission/removal estimate for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	Not an issue/problem
Agriculture			
A.12	3. General (agriculture)	Recalculations were made to the agriculture sector that changed the emission/removal estimate for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	Not an issue/problem
LULUCF			
L.4	4. General (LULUCF)	Recalculations were made to the LULUCF sector that changed the emission/removal estimate for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	Not an issue/problem
Waste			
W.6	5.D Wastewater treatment and discharge – CH_4 and N_2O	The ERT noted that, in the 2017 NIR (table 7.5.1), the values reported for the total volume of wastewater discharged and its treatment in 2014 have changed since the 2016 annual submission, while in table 7.5.3 of the 2017 NIR, the reported total organically degradable carbon is the same as the value reported in the 2016 submission. Similarly, in table 7.5.3 of the 2017 NIR (which is titled "Domestic and industrial wastewater treatment (1985–2015)"), the shares (per cent) of domestic wastewater treatment in primary, secondary and advanced systems have changed compared with the previous submission. The values reported for CH_4 emissions and biogases have also changed since the 2016 annual submission. The ERT further noted that, although Hungary reported that a recalculation was carried out in the 2017 annual submission, information on the changes in AD and the reasons for those changes were not included in the NIR. During the review, the Party explained that the recalculations of biogas production data in the energy statistics were made back to 2012 (e.g. for 2014, the value was revised from 587 TJ to 731 TJ for the 2017 annual submission). The	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		values were revised to reflect data obtained on the unintentional leakage of CH_4 during anaerobic digestion of sewage sludge. The Party also explained that the share of the volume of water treated in different ways (reported in table 7.5.1 of the 2017 NIR) has changed slightly since the previous submission, partly because of changes in the published statistics. In addition, the Party informed the ERT that, in table 7.5.1 of the 2017 NIR, the share for the data for the period 1990–2011 is based on the total volume of wastewater discharged to public sewerage, while for the years 2012–2015 the share is based on the volume of wastewater discharged to public sewerage or transported directly to public wastewater treatment plants and the treated total. The Party considered that the latter approach might have been better for calculating the parameter T_{PLANT} (degree of utilization of modern centralized wastewater treatment plants) for direct N_2O emissions. The ERT notes that this approach taken by the Party rendered the time series of the emission estimates under this category inconsistent. The ERT recommends that Hungary provide detailed information in the NIR on any recalculations performed since the previous submission, including all reasons and justification(s) for the recalculations and the impact of the changes.	
W.7	5.D Wastewater treatment and discharge – CH_4 and N_2O	The ERT noted that the share for the data for the period 1990–2011 is based on the total volume of wastewater discharged to public sewerage, while for the years 2012–2015 the share is based on the volume of wastewater discharged to public sewerage or transported directly to public wastewater treatment plants and the treated total) (see ID# W.6 above). The ERT recommends that Hungary demonstrate in the NIR that the application of two different methods for the share of the volume of water treated in different ways results in a consistent time series and, if this is not possible, the ERT recommends that the Party update its method to ensure a consistent time series, taking into account the methods contained in the 2006 IPCC Guidelines (volume 1, chapter 5).	Yes. Consistency
KP-LULUCF			
KL.3	General (KP-LULUCF) – CO_2 and N_2O	Recalculations made to KP-LULUCF activities changed the emission/removal estimate for a category by more than 2 per cent and/or national total emissions by more than 0.5 per cent; however, the ERT did not identify any issues or problems with these recalculations.	Not a problem

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

10. Table 6 contains additional findings made by the ERT during the 2017 individual review that are not covered in table 3 or 5, but are within the scope of the desk review as specified in paragraph 76 of the UNFCCC review guidelines or paragraph 65 of the Article 8 review guidelines and are findings that the ERT wishes to convey to the Party.

Table 6
Additional findings made during the 2017 individual review of the annual submission of Hungary

ID[a]	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem[b]? If yes, classify by type*
G.6	QA/QC and verification	In response to questions raised by the ERT during the review to assess implementation of recommendation ID# G.2 in table 3, Hungary explained how it is utilizing the EU internal review as a QA procedure before submission of the annual inventory to the UNFCCC secretariat. In addition, Hungary explained that it is taking part in regional QA/QC cooperation with Czechia and Slovakia. The ERT recommends that Hungary improve the transparency of the NIR by including information on: how external QA results are taken into consideration in the national inventory development plan, for example, what measures are included in the EU review and how its results relating to Hungary are used to improve the inventory; and current as well as planned regional QA activities (expert peer review).	Yes. Transparency
Energy			
E.7	1.A.1 Energy industries – gaseous fuels – CO_2	Hungary stated in the NIR (section 3.2.5.4, p.56) that country-specific EFs for natural gas consumption were used for the period 2010–2013. However, no information was provided for the years prior to 2010 or for the period 2014–2015. During the review, Hungary explained that, for power plants (category 1.A.1.a), a default EF (i.e. 56.1 t CO_2/TJ) was applied for the years before 2010 and after 2013. For the refinery (1.A.1.b) and coking plant (1.A.1.c), plant-specific EFs were also used after 2013. Further, the Party agreed that that this might introduce some minor inconsistencies in the time series. The Party also indicated its concern that power plants might change their tier approaches from one year to another under the EU ETS. The ERT recommends that Hungary provide in future NIRs the country-specific CO_2 EFs used to calculate natural gas consumption for the entire time series with a description of how time-series consistency is ensured.	Yes. Transparency
E.8	1.A.2.g Other (manufacturing industries and construction) – all fuels – CO_2, CH_4 and N_2O	In the NIR (section 3.2, p.43), Hungary stated that "The fuel use and emissions of autoproducer plants (that generate electricity or heat, wholly or partly for their own use as an activity which supports their primary activity) are accounted for in this inventory mostly under other stationary combustion (1.A.2.g) which means not under the relevant category and not in energy industries". The ERT noted that the 2006 IPCC Guidelines (chapter 2, section 2.2, entitled "Description of sources") states that emissions from autoproducers should be assigned to the sector where they were generated. During the review, Hungary explained to the ERT that it does not regularly collect fuel consumption data from autoproducers. The Party also informed the ERT that it gathered this information two years ago, but only for one year; however, the data were used for the emission estimates. The ERT recommends that Hungary use the results of the information gathered from autoproducers, including the information on the proportion of fuel consumed by autoproducers, and allocate the emissions from autoproducers under the sector where they were generated, in accordance with the methods in the 2006 IPCC Guidelines.	Yes. Comparability

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and or a problem?[2] If yes, classify by type*
E.9	1.A.3.c Railways – solid and liquid fuels – CO_2, CH_4 and N_2O	The Party explained in the NIR that the annual total emissions of the national railway were determined based on the data received from the national energy statistics provider, the Hungarian Energy and Public Utility Regulatory Authority, which calculated the quantity of fuel used in national railway transport. The CO_2 emissions from railway transport are indicated as a key category by trend. However, the ERT noted that no information on the EFs used to estimate emissions from railways is provided in the NIR. During the review, Hungary explained that it mostly used default EFs, as reported in the CRF tables. The Party further explained that the only exception is lignite, for which the same country-specific CO_2 EF is applied as that used for other parts of the inventory to calculate emissions when lignite is burned. The ERT notes that in CRF table 1A(a)s3 solid fuel consumption is reported as "NO" for railways since 2005, and that in the NIR the Party indicates that this is due to the electrification of railways. The ERT recommends that the Party report in the NIR the EFs used to estimate the emissions from railways.	Yes. Transparency
E.10	1.A.3.c Railways – solid and liquid fuels –CO_2	During the review, Hungary explained that it used default EFs in estimate CO_2 emissions from this category, with the exception of lignite (see ID# E.9 above). Noting that the CO_2 emissions from railways is a key category for Hungary, the ERT recommends that the Party develop country-specific EFs for all fuels to estimate CO_2 emissions from this category.	Yes. Accuracy
E.11	International navigation – liquid fuels – CO_2, CH_4 and N_2O	Hungary reported emissions from residual fuel oil, gas/diesel oil and gasoline from international navigation as "NE". In the NIR, the Party explained that consumption from international navigation was not considered because separate data on the use of fuel for international navigation are not included in the national statistics. During the review, the Party informed the ERT that AD are not currently available for this sector from the national energy statistics, but that ports could be contacted to ascertain whether they are selling fuel to international ships. The ERT encourages the Party to estimate the emissions from residual fuel oil, gas/diesel oil and gasoline used in international navigation, as indicated in the 2006 IPCC Guidelines.	Not an issue/problem
IPPU			
I.10	2.A.3 Glass production – CO_2	The ERT notes that Hungary explained that a country-specific method is used to estimate CO_2 emissions from glass production. In CRF table 2(I).A-H for 2015, the CO_2 IEF for glass production is reported as 0.11 t/t, which is below the default EF (0.20 t CO_2/t glass) of the tier 1 method provided in the 2006 IPCC Guidelines. In figure 4.3.5 of the 2017 NIR (p.107), the production and the emissions correlate for most years of the time series, except for the period 2007–2009, in which the production decreases by 8.1 per cent, but the CO_2 emissions decrease significantly, by 29.1 per cent. The ERT also noted that CO_2 emissions in 2015 (55.25 kt) decreased since 2014 (58.81 kt); however, the production data for 2015 are not provided in the figure (according to CRF table 2(I).A-Hs1, AD increased by 5.8 per cent between 2014 and 2015, while CO_2 emissions decreased by 6.1 per cent). During the review, Hungary explained that the AD presented in the NIR are not those used for the emission estimates for the period 2005–2015. The AD were obtained from the Hungarian Central Statistical Office for the whole time series, while the emissions for the period 2005–2015 were calculated from the EU ETS database (adding +10 per cent to cover	Yes. Accuracy

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem[b]? If yes, classify by type
		the non-ETS part). Further, Hungary explained that the reliability of the emission estimates based on the EU ETS database is higher than those based on the AD provided by the Hungarian Central Statistical Office because those AD cover not only glass production, but also glass processing. Therefore, the Party considers that the decreasing trend in emissions for the period 2007–2009 and for 2015 is correct. The Party further explained that the AD for this category are under investigation in order to ensure a consistent time series, but it also noted many related problems, such as changes in statistical collection methods (inconsistent units, new categorization) and confidential data. The ERT recommends that the Party complete its research and obtain correct AD for the latest years to calculate the estimates of CO_2 emissions from glass production, if appropriate.	
I.11	2.B.1 Ammonia production – CO_2	Hungary reported emissions from hydrogen production at ammonia production plants, although hydrogen production takes place in another plant. No explanation of this allocation of emissions was provided in the NIR. During the review, the Party explained that one of the ammonia production plants uses hydrogen produced from natural gas by another plant for ammonia production, and that if the emissions from hydrogen production were allocated elsewhere, the emissions from ammonia production and hydrogen production would both become confidential. The ERT understands the problem of confidentiality for the reporting of CO_2 emissions from this category, and since the 2006 IPCC Guidelines do not provide a method for the calculation of the emissions from hydrogen production, the ERT agrees that the method used by Hungary is the best solution. The ERT recommends that the Party transparently explain in the NIR why the emissions from hydrogen production are reported under the category ammonia production.	Yes. Transparency
I.12	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	Hungary reported in the NIR that it uses a tier 2b mass balance approach to calculate emissions from refrigeration and air conditioning. Hungary further reported in the NIR that the import and export data are collected at the application level and not at the sub-application level. To split the data into the sub-application level, the Party used a study published in 2013 by the EU Directorate-General for Climate Action (available at https://ec.europa.eu/clima/policies/f-gas_en). However, the ERT notes that, for a tier 2 method, the Party has to collect the AD at the sub-application level every year, since the 2006 IPCC Guidelines state that: "Both Tier 2a and Tier 2b methods require the development of a matrix for each sub-application based on equipment type on the one hand and refrigerant type on the other hand. In order to derive the number of pieces of equipment for all the vintages, historic net consumption activity data is also required. The annual update of the matrix makes it possible to recalculate all emission types as detailed in Equations 7.10 to 7.14 each year. Moreover, the refrigerant choice has to be assessed on a year-by-year basis owing to changing national regulations (often relating to CFC and HCFC phase-out at different dates) and changing technological choices". Therefore, the ERT considers that the method used by Hungary for estimating the F-gases from refrigeration and air conditioning should be classified as a tier 1b method and not a tier 2b method. Noting that the HFC and PFC emissions from refrigeration and air conditioning is a key category for Hungary, the ERT considers that good practice is to make efforts to apply a tier 2 method, in accordance with the decision tree provided in figure 7.6 of the 2006 IPCC Guidelines	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem[23] If yes, classify by type
		(volume 3, chapter 7, p.7.46). The ERT therefore recommends that the Party implement a tier 2 method to estimate the emissions of F-gases from refrigeration and air conditioning.	
I.13	2.F.1 Refrigeration and air conditioning – HFCs and PFCs	Further to the issues explained for ID# I.12 above, the ERT noted that, when estimating emissions from refrigeration and air conditioning, Hungary considered the imported and exported amounts of F-gases in bulk. The ERT further noted that Hungary has not accounted for the emissions of F-gases imported and exported in equipment in all subcategories under refrigeration and air conditioning, including: the use of refrigeration in supermarkets for the subcategory commercial refrigeration; refrigeration units for private households for domestic refrigeration; installations for food and drink producers for industrial refrigeration; cooling vehicles and cooling containers for transport refrigeration; mobile air conditioning for cars, buses, planes and ships; and chiller, small air-conditioning devices for stationary air conditioning and others. During the review, Hungary informed the ERT that the information on the amount of prefilled equipment containing F-gases, as well as the information on the amount of exported equipment filled (and accounted for) domestically, are not available. The ERT notes that, according to the 2006 IPCC Guidelines (volume 3, chapter 7, p.7.13, table 7.2), data on chemical sales by application (country-specific or globally/regionally derived) and data on historic and current equipment sales adjusted for import/export by application (country-specific or globally/regionally derived) are required for the tier 1b method. The ERT concluded that failure to adjust the chemical sales data for imports and exports could lead to a potential underestimation of emissions for 2013–2015 and therefore included this issue in the list of potential problems and further questions raised by the ERT. In response to the list of potential problems, the Party provided revised HFC emission estimates. In revising the estimates, Hungary applied the bottom-up approach, instead of the mass balance and top-down approaches that were used for the original estimates, for domestic refrigeration and mobile air conditioning. Further, for domestic refrigeration, Hungary used data from the one national producer and from statistics on imports of refrigerators. For mobile air conditioning, data on cars produced in Hungary and on the number of cars registered in Hungary were collected to estimate the emissions. However, for commercial refrigeration, industrial refrigeration, transport refrigeration and stationary air conditioning, the ERT notes that the Party did not change its top-down approach for estimating emissions from HFCs and PFCs, although there was some improvement, such as the inclusion of blend 404A in equipment imported in the data on imports and exports of F-gases for 2015. However, the ERT agrees with the result of the comparative analysis done by Hungary on per capita HFC emissions with neighbouring Parties, which indicates that the average of those neighbouring Parties (Czechia, Poland, Slovenia and Slovakia) and the EU (205 kg/per capita) is almost equal to or lower than the per capita emission of Hungary (219 kg/per capita). Considering this result, the ERT decided that the adjustment is not applied to this potential problem. The ERT recommends that Hungary include emissions from F-gases imported and exported in bulk, and imported and exported contained in equipment, for the subcategories commercial refrigeration, domestic refrigeration, industrial refrigeration, transport refrigeration, mobile air conditioning and stationary air conditioning, providing all necessary explanations of the methodologies EFs and assumptions used.	Yes. Accuracy

ID[a]	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and/or a problem*[b] *If yes, classify by type*
I.14	2.G.1 Electrical equipment – SF_6	Hungary reported in the NIR (p.160) that, for the emissions from electrical equipment, annual sales data for 2014 are not yet available due to major restructuring of the institutes handling the database. Therefore, as a temporary measure, to extrapolate the data for 2014, the volume index of electrical equipment manufacture from the Hungarian Central Statistical Office (= 107 per cent compared with 2013) was used as surrogate data. During the review, the Party explained that although a request was sent to the Hungarian National Climate Protection Authority in order to obtain the 2014 data set, the database is not available for that year. The Party also indicated that, as soon as data for 2014 become available, it will replace the previous estimate with the new data set. The ERT recommends that Hungary obtain annual sales data for 2014 to replace the interpolated data for 2014 if the data of that year are still not available for the next submission.	Yes. Accuracy
I.15	2.G.2 SF_6 and PFCs from other product use – SF_6	Hungary indicated in the NIR (p.160) that SF_6 used for soundproof window production was estimated with the assumption of "prompt" emissions, which is recommended in the case of any other applications. The SF_6 used for soundproof window production was banned by an EU regulation introduced in 2006 (842/2006/EC). However, the Party does not yet have any direct data to estimate SF_6 emissions from the potential existing stock of soundproof windows separately from the production data. Therefore, emissions from this subcategory are reported as "IE" and included under the subcategory "other" of the category SF_6 and PFCs from other product use. In the 2017 NIR, Hungary reported that it plans to calculate these emissions separately. However, during the review, the Party informed the ERT that the data requests are ongoing. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimate of emissions from this category. The ERT recommends that the Party obtain data on existing stocks of soundproof windows, and estimate and report the SF_6 emissions from soundproof windows separately under this category.	Yes. Accuracy
Agriculture			
A.13	3.B.5 Indirect N_2O emissions – N_2O	The Party stated that it used tier 2 methods for estimating indirect N_2O emissions from manure management for cattle and swine, and tier 1 methods for other livestock. The Party developed a country-specific, species-specific value for the percentage of managed manure N for livestock category *T* that volatilizes as NH_3 and NOx in the manure management system ($Frac_{GasMS}$), which ranges from 0.01 to 0.49 and varies slightly by year. In the NIR, the Party states that "The country-specific $Frac_{GasMS}$ was calculated based on the NH_3 and NOx emissions…reported to the UNECE under the LRTAP Convention". The Party uses $Frac_{GasMS}$ in equation 10.26 of the 2006 IPCC Guidelines to estimate N losses due to volatilization from manure management. During the review, the Party explained that the most up-to-date methodology (EEA, 2016) was used to calculate the agricultural NH_3 and NOx emissions. The Party also provided the spreadsheet used for the calculations that shows the $Frac_{GasMS}$ used for the whole time series. Based on this information, the ERT finds the Party's method of developing the $Frac_{GasMS}$ value acceptable. However, the method used by the Party to develop $Frac_{GasMS}$ is not described in a transparent manner in the NIR and the values are not reported, which prevented the ERT from reviewing the information.	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem[b]? If yes, classify by type
		The ERT recommends that the Party include more detailed information in the NIR on how the value for $Frac_{GasMS}$ was developed.	
A.14	3.D.a.4 Crop residues – N_2O	The Party stated in the NIR that the fraction of above-ground residues of crop removed annually ($Frac_{Remove}$) is based on the amount of straw used as bedding (consistent with the calculations of the total annual amount of organic N fertilizer applied to soil). $Frac_{Remove}$ is used in equations 11.6 and 11.7A of the 2006 IPCC Guidelines. However, the $Frac_{Remove}$ values used by the Party to calculate the N_2O emission estimates are not reported in the NIR. During the review, the Party provided the time series of values of $Frac_{Remove}$, which range from 14 to 41 per cent; however, the Party did not provide an explanation of the source of the data. The 2006 IPCC Guidelines (volume 4, chapter 11, p.11.14) state, "Survey of experts in country is required to obtain data. If data for $Frac_{Remove}$ are not available, assume no removal". The ERT considers that in order to justify the values for $Frac_{Remove}$ used by the Party for the N_2O emission estimates, more detailed information is required on how the value was obtained.	Yes. Transparency
		The ERT recommends that the Party justify its application of $Frac_{Remove}$ by documenting the data source and explaining how the data were obtained for the estimates of $Frac_{Remove}$ and provide a time series of $Frac_{Remove}$ values in the NIR.	
A.15	3.D.a.5 Mineralization /immobilization associated with loss/gain of soil organic matter – N_2O	The Party has reported N mineralization associated with loss of SOM from the base year to 2005 and from 2011 to 2015. The Party stated that it applied equation 11.8 of the 2006 IPCC Guidelines based on AD on mineral soils in cropland remaining cropland. However, the Party did not state which tier method was used or the source of the data. During the review, the Party stated that it used tier 1 methods and AD provided by the National Food Chain Safety Office, divided into set-aside and non-set-aside cropland.	Yes. Transparency
		The ERT recommends that the Party provide the source of the AD for N mineralization associated with loss of SOM and the tier of the methodology used in the NIR.	
LULUCF			
L.5	4. General (LULUCF) – CO_2, CH_4 and N_2O	The section of the NIR on the LULUCF sector was well organized and most of the necessary information was provided in the NIR. However, the ERT still noted errors and missing information in the NIR. For example, there was an error regarding the area of non-set-aside grassland in the land-use matrix table in the NIR due to the incorrect rounding used when converting units from kha to ha; and cropland is referred to in the explanation of the parameter used for grassland.	Yes. Transparency
		Based on the clarifications provided by Hungary during the review, the ERT recommends that the Party include the following improvements in the NIR: correct the incorrect values for the non-set-aside grassland area in the land-use matrix table (table 6.3.6 in the 2017 NIR); and correct the description of how the B_{BEFORE} value used for the biomass carbon stock change estimate for land converted to settlements was derived.	
L.6	4. General (LULUCF) –	In relation to ID#s L.7 and L.14 below, the ERT noted that Hungary does not estimate and report the carbon stock changes and emissions/removals from all mandatory categories in the LULUCF sector. The ERT also noted that the justification for the exclusion of the emissions/removals in the NIR and in CRF table 9 is not transparently documented.	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[b] If yes, classify by type
	CO_2, CH_4 and N_2O	In response to questions raised by the ERT during the review, Hungary explained that it considers the missing estimates to be insignificant. The ERT recommends that Hungary provide justification in the NIR, both qualitatively and quantitatively (for example in the form of a table), that the total national aggregate of estimated emissions for all gases and categories considered insignificant shall remain below 0.1 per cent of the national total GHG emissions, in accordance with paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	
L.7	4.A.2 Land converted to forest land – CO_2	Hungary reported the deadwood and litter carbon stock changes in wetlands converted to forest land and the deadwood carbon stock changes in settlements converted to forest land as "NE". During the review, Hungary informed the ERT that it considered these small removals to be insignificant in terms of their impact, but that it will improve the estimates for litter by including the carbon stock changes under wetlands converted to forest land and will also provide estimates of the deadwood carbon stock changes in land converted to forest land. The ERT confirmed that the impact of these missing estimates is very small and below the threshold of insignificance set out in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines based on the calculation using the land-use change areas with the estimation method applied to the other land-use conversion to forest land categories. The ERT recommends that Hungary either include the estimate of the carbon stock changes in litter and deadwood in wetlands converted to forest land and deadwood in settlements converted to forest land or provide information, in the NIR, confirming that these removals meet the threshold of insignificant in line with the procedure set out in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Yes. Transparency
L.8	4.C.1 Grassland remaining grassland – CO_2	Hungary reported carbon stock changes in the living biomass pool under grassland remaining grassland as "NO". In the NIR (p.340), the Party indicated that the study conducted in 2016, together with expert judgment, suggested that the total biomass is around the default IPCC value. During the review, the Party further explained that the change of grassland management, such as from non-set-aside grassland to set-aside grassland and vice versa, does not lead to a change in grassland productivity in biomass. The Party further explained that it applied a tier 1 method because the biomass pool for grassland remaining grassland is considered a non-key category component. Noting this, the ERT considers that reporting with "NA" is appropriate for this case because the activity occurs but does not result in any emissions or removals. The ERT recommends that the Party modify the notation key of this pool to "NA".	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
L.9	4.D.1 Wetlands remaining wetlands – CO_2	The ERT noted that the carbon stock changes reported for organic soils under flooded land remaining flooded land in CRF table 4.D represented carbon gains for some years (i.e. 1985–1988, 2008, 2010, 2011 and 2013–2015). The ERT understands that, in accordance with the method provided in the 2006 IPCC Guidelines and the Wetlands Supplement, organic soil carbon gains only occur when rewetting practices are implemented. The ERT further noted that the notation key "IE" was used for the area of mineral soils under peat extraction remaining peat extraction in CRF table 4.D, indicating that the emissions reported under organic soils also include the emissions from mineral soils. The ERT considers that emissions from mineral soils under the subcategory peat extraction remaining peat extraction theoretically	Yes. Comparability

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem[b]? If yes, classify by type
		do not occur because mineral soil is out of the scope of "peat" in terms of its definition. During the review, the Party explained that it included mineral soil carbon stock changes with wet grassland conditions under the category wetlands remaining wetlands and used the peat extraction category for reporting this source. Therefore, carbon gains were reported in some years from organic soils and "IE" was used for mineral soils. The ERT recommends that, if Hungary estimates the country-specific carbon stock changes for its lands for which the standard land-use categories based on the 2006 IPCC Guidelines (e.g. peat extraction and flooded land remaining flooded land) are not applicable, for instance the mineral soil carbon stock changes under wetlands remaining wetlands with grass vegetation, the Party examine the way to report the carbon stock changes in such lands under "other wetlands" with a notification in the documentation box or in the comment box in the CRF tables, together with a clear explanation in the relevant section of the NIR of where in the CRF tables the emissions from those lands are reported.	
L.10	4.D.1.1 Peat extraction remaining peat extraction – CO_2 and N_2O	Hungary reported, in CRF tables 4.D and 4(II), a small area of peat extraction (1.81 kha for 2015) and the associated CO_2 and N_2O emissions in CRF table 4(II) (CH_4 emissions are reported as "NO"). The area was estimated by cumulating the annual areas that have been converted to peat extraction since 1995. During the review, Hungary explained that most sites have continued to extract peat since 1995, but the situation regarding land use or land management after peat extraction has ceased on such sites is unknown and that it will request site-specific information from the relevant national agency. The ERT notes that the various situations that occur after extraction has ceased, such as abandonment, restoration or land conversion, result in different levels of emissions according to the 2006 IPCC Guidelines and the Wetlands Supplement. The ERT also notes the small impact of these lands on the national level of emissions. The ERT encourages Hungary to undertake further research on site-specific information on the practices taking place at peat extraction sites after extraction ceases, if resource allocation allows the Party to do so.	Not an issue/not a problem
L.11	4.D.1.1 Peat extraction remaining peat extraction – CO_2, CH_4 and N_2O	The ERT noted that Hungary did not provide, in the NIR, information on how nutrient-rich and nutrient-poor organic soils under peat extraction are estimated, which made it difficult for the ERT to clearly understand the method applied in estimating the emissions from this category. During the review, the Party explained that nutrient-rich and nutrient-poor organic soils were classified based on the type of organic material in the soil. The ERT recommends that the Party provide information on the method used, along with the AD and EFs applied, to estimate nutrient-rich and nutrient-poor organic soils under peat extraction.	Yes. Transparency
L.12	4.D Wetlands – CO_2, CH_4 and N_2O	The Wetlands Supplement was only used for an EF for forest land organic soils; other parts of that guidance were not applied. During the review, Hungary explained that the application of the Wetlands Supplement will be considered at a later stage in its inventory development, taking into account the low significance of managed wetlands in Hungary and the priority of its resource allocation. The ERT encourages the Party to continue its efforts and to use the Wetlands Supplement in preparing its annual inventories in future annual submissions, taking into account the encouragement stated in paragraph 4 of the UNFCCC	Not an issue/not a problem

ID#	*Finding classification*	*Description of the finding with recommendation or encouragement*	*Is finding an issue and or a problem[20] If yes, classify by type*
		Annex I inventory reporting guidelines.	
L.13	4 (II) Emissions and removals from drainage and rewetting and other management of organic/mineral soils – CO_2	The ERT noted that, in CRF table 4(II), Hungary reported CO_2 emissions of 223.45 kt from peat extraction lands in 2015, which is disproportionately high when compared with the reported area of 1.81 kha. During the review, the Party explained that the value reported in the CRF table appeared to be a mistake The ERT recommends that the Party correct its reporting of CO_2 emissions from peat extraction in CRF table 4(II) and provide the correct value or a notation key.	Yes. Accuracy
L.14	4(IV) Indirect N_2O emissions from managed soils – N_2O	Indirect N_2O emissions from leaching and run-off relating to N mineralization associated with loss of SOM resulting from change of land use or management on mineral soils were reported as "IE", with the explanation that this source was included under the agriculture sector. During the review, Hungary confirmed that N mineralization associated with loss of soil organic carbon occurred in land converted to forest land, land converted to cropland and land converted to settlements was not included under the agriculture sector and was therefore not estimated. The Party also provided the preliminary quantitative information on the likely indirect N_2O emissions from mineralization of land converted to forest land and land converted to settlements in relation with the request of the ERT on the activities under Article 3, paragraph 3, of the Kyoto Protocol (see also ID# KL.6 below). Based on this information, with suggested modifications of correcting errors by the ERT, the ERT confirmed that the impact of these missing estimates is below the threshold of insignificance set out in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines based on the calculation using the relevant direct N_2O emissions from the same source with a tier 1 estimation method. The ERT recommends that Hungary include the estimate of indirect N_2O emissions from leaching and run-off relating to N mineralization associated with loss of SOM resulting from land converted to forest land, land converted to cropland and land converted to settlements.	Yes. Completeness
L.15	4(V) Biomass burning – CH_4 and N_2O	The ERT noted that, although the basic methodologies and source of the burned area of wildfires were explained in the NIR (section 6.4.3), some methodological elements of non-CO_2 emissions from wildfires and category-specific information on the parameters for biomass burning used for the emission estimates from this category were not provided. This made it difficult for the ERT to understand how the calculations were performed. During the review, the Party provided additional information including its use of mass of fuel (M_B), combustion factor (C_f) and EFs (G_{ef}) for forest land and cropland and the clarification of the information included in the NIR. The ERT recommends that the Party provide category-specific information on the following parameters used for the estimates of biomass burning in cropland (C_f and G_{ef}) and grassland (M_B, C_f and G_{ef}), as appropriate based on the information provided by the Party during the review.	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem[b]? If yes, classify by type
Waste			
W.8	5.A Solid waste disposal on land – CH_4	In CRF table 5.A, the "Annual waste at the SWDS" was reported as 3,084.69 kt; however, in NIR table 7.2.5, the summary AD were reported as 3,063 kt (1,991 kt (MSW) + 842 kt (construction and demolition waste) + 230 kt (industrial waste)). During the review, Hungary explained that it also included 22 kt of disposed sludge in the emission estimates, which was missing from table 7.2.5 of the NIR. The ERT recommends that Hungary include information on the amount of sludge disposed in the landfill sites in the NIR in order to ensure the consistency between the data provided in the NIR and the emissions reported in CRF table 5.A.	Yes. Transparency
W.9	5.A.1 Managed waste disposal sites – CH_4	In the NIR (p.359), Hungary reported that "The total amount of MSW was 3,710 Gg in 2015. Out of this, 1,194 Gg (32%) was recovered by recycling and composting, 525 Gg (14%) was incinerated for energy purposes, and 1,991 Gg (54%) went to landfills". The Party also indicated in the NIR (p.362) that "Our data source for these waste categories was the Waste Management Information System for the period 2005–2015". However, the ERT noted that, in CRF table 5.A, the annual waste at SWDS (in kt) was reported as 3,084.69 kt, which was anaerobic waste treated in managed waste disposal sites, and this figure was used to calculate the CH_4 emissions. The ERT further noted that the data from the "Waste Management Information System" (available at http://terkep.kvvm.hu/hirweb/) seem to be different from the data used to estimate the emissions. During the review, Hungary explained that, as indicated in the 2017 NIR (p.316), the value of 3,710 Gg reported for the total amount of MSW for 2015 does not include industrial waste, and when compiling the AD, industrial waste is taken into account. The Party also provided a detailed explanation of how the data from the Waste Management Information System are sorted by waste and treatment types and processed, as well as the QC procedures conducted for evaluating the accuracy of AD. The ERT recommends that Hungary provide, in the NIR, information on how Hungary uses information contained in the Waste Management Information System to determine the amount of waste by type and by treatment for purposes of the GHG inventory calculations and the assumptions used in the procedure.	Yes. Transparency
W.10	5.A.2 Unmanaged waste disposal sites – CH_4	The information provided in the NIR (p.363) indicates that before 2000 there were unmanaged waste landfills in Hungary. After 2000, there were no unmanaged waste disposal sites in Hungary. However, in CRF table 5, the notation key "IE" was reported for the CH_4 emissions from unmanaged waste disposal sites for all years (including for the period 1990–1999, the time when there were unmanaged waste disposal sites in Hungary). The amount of waste in the unmanaged landfills reported in CRF table 5.A for the years 1990–1999, as well as the base year, was reported as "IE". Further, the ERT noted that there is no information on the use of the notation key "IE" in CRF table 9. During the review, Hungary provided the rationale for its choice of using the notation key "IE" to report emissions from unmanaged SWDS also after 2000, as follows: even though there were no longer any unmanaged sites in operation, emissions were still produced in closed sites by waste disposed in previous years. The Party uses the IPCC waste model in estimate emissions from waste disposal sites. One of the input parameters of the model is "distribution of waste by waste management type" which reflects the share of unmanaged/managed sites in a given year; however, this model does not provide estimation results	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem[29] If yes, classify by type
		separately for different types of disposal sites, but only a single emission value per year. Therefore, the Party decided to report all AD and emissions under the category managed waste disposal sites and used the notation key "IE" for unmanaged waste disposal sites even after 2000, in order to reflect emissions from unmanaged disposal sites in operation before 2000 that might still produce emissions. The ERT recommends that Hungary clarify in its NIR both the reason for choosing the notation key "IE" to report unmanaged waste disposal sites and where the emissions are reported, for the whole time series.	
W.11	5.C.1 Waste incineration – CO_2	In the NIR (table 7.4.1), the AD include liquid waste (waste oil) amounting to 45.3 kt, clinical waste (industry waste) totalling 2.6 kt, hazardous waste (non-liquid) amounting to 32.5 kt, industrial sludge (non-hazardous) totalling 5.9 kt and industrial solid waste amounting to 5.6 kt for 2015. However, the ERT noted that, in CRF table 5.C for 2015, biogenic waste incinerated is reported as 5.31 kt and non-biogenic waste is reported as 86.55 kt. In the NIR, there is no description about how the biogenic waste was determined from the AD listed in table 7.4.1 of the NIR. During the review, Hungary explained that it determined the amount of biogenic waste based on the fraction of DOC and fossil carbon within total carbon. For example, in the case of liquid fuels (waste oil), 100 per cent of the total carbon is considered to be fossil carbon, therefore the total amount of liquid waste is allocated to the non-biogenic category. In the case of clinical waste, it can be ascertained from table 2.6 of the 2006 IPCC Guidelines that the total carbon content is 40 per cent, of which 15 per cent is DOC and 25 per cent is fossil carbon. The ERT recommends that Hungary include in the NIR an explanation of how it determined the amount of non-biogenic waste incinerated, in order to make the information in the NIR and the CRF tables consistent.	Yes. Transparency
KP-LULUCF			
KL.4	*Forest management – CO_2, CH_4 and N_2O*	Hungary provided information on the impact of the technical correction of the FMRL in line with the guidance contained in the Kyoto Protocol Supplement in accordance with decision 2/CMP.8, annex II, paragraph 5(f), and pursuant to decision 2/CMP.7, annex, paragraph 14. The figure derived from the technical correction was rounded to the kt CO_2 eq level (–40.00 kt CO_2 eq). Hungary explained during the review that this was because, owing to methodological issues, the uncertainty of large numbers is much greater than rounding errors, and because the FMRL, as defined in decision 2/CMP.8, was also presented up to the kt CO_2 eq level. The ERT considers that the approach taken by Hungary is practical.	Not a problem
KL.5	Harvested wood products – CO_2	Hungary explained in its NIR (p.435) that it has chosen not to account for the emissions from HWP originating from forests prior to the start of the second commitment period because the FMRL was based on a projection (issue relating to the reporting requirement set out in decision 2/CMP.8, annex II, paragraph 2(g)(iii)). In this case the initial stock of HWP at the start of the second commitment period must be 0, because existing HWP would be ignored, in accordance with the Kyoto Protocol Supplement (p.2.121). However, in CRF table 4(KP-I)C for the year 2013, initial stocks were entered and assumed to be used for estimating losses in carbon stock changes in HWP for subsequent years. Thus, the reported carbon stock changes in HWP under KP-LULUCF activities were considered, including emissions from HWP originating from	Yes. Transparency

ID[a]	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and or a problem[a]? If yes, classify by type
		forests prior to the start of the second commitment period. The ERT considers that the information provided in the NIR on the requirements set out in decision 2/CMP.8, annex II, paragraph 2(g)(iii) and 2(g)(iv), was not accurately described. The ERT recommends that Hungary improve its explanation of the methods for estimating and accounting HWP, taking into account the following points: (a) Provide accurate information on the treatment of emissions from HWP originating from forests prior to the start of the second commitment period and describe how these emissions are included in the accounting (see decision 2/CMP.8, annex II, paragraph 2(g)(iii)); (b) Provide further methodological information on how the emissions from HWP already accounted for during the first commitment period on the basis of instantaneous oxidation were excluded. The emissions estimated based on the first-order decay method occurred from wood harvested in previous years and so explaining that emissions occurred only in the second commitment period does not prove the exclusion of emissions that are already accounted as instantaneous oxidation during the first commitment period (see decision 2/CMP.8, annex II, paragraph 2(g)(iv)).	
KL.6	N_2O emissions from N mineralization/ immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils – N_2O	Indirect N_2O emissions from leaching and run-off relating to N mineralization associated with loss of SOM resulting from activities under Article 3, paragraph 3, of the Kyoto Protocol were not reported. During the review, the Party provided the preliminary quantitative information on the likely indirect N_2O emissions from mineralization of land converted to forest land and land converted to settlements using F_{SOM} relating to activities under Article 3, paragraph 3, of the Kyoto Protocol, and default parameters for EF_5 and $Frac_{LEACH-(H)}$ from the 2006 IPCC Guidelines (chapter 11, table 11.3). Based on this information, with suggested modifications of correcting errors by the ERT, the ERT confirmed that the impact of these missing estimates is below the threshold of insignificance set out in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines. The ERT recommends that Hungary include the estimates of indirect N_2O emissions from leaching and run-off relating to N mineralization associated with loss of SOM resulting from activities under Article 3, paragraph 3, of the Kyoto Protocol.	Yes. Completeness

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

VI. Application of adjustments

11. The ERT has not identified the need to apply any adjustments to the 2017 annual submission of Hungary.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. Annex I shows the accounting quantities for KP-LULUCF activities as reported by the Party and the final values after the review. The final quantity of units to be issued and cancelled are presented in the same annex.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the review.

Annex I

Overview of greenhouse gas emissions and removals for Hungary for submission year 2017 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by Hungary

1. Tables 7–10 provide an overview of total GHG emissions and removals as submitted by Hungary.

Table 7
Total greenhouse gas emissions for Hungary, base year[a]–2015
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions including indirect CO_2 emissions[b]*		*Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]*	*KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]*	*KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)*	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*			*CM, GM, RV, WDR*	*FM*
FMRL								–1 000.00
Base year	107 697.50	109 505.42	NA	NA	NA			
1990	91 224.29	93 895.89	NA	NA				
1995	69 788.39	75 487.82	NA	NA				
2000	72 659.83	73 427.06	NA	NA				
2010	60 921.84	65 473.72	NA	NA				
2011	59 759.30	63 908.65	NA	NA				
2012	55 360.66	60 224.26	NA	NA				
2013	53 581.49	57 456.23	NA	NA		–1 112.01	NA	–1 534.90
2014	52 576.06	57 937.27	NA	NA		–920.04	NA	–3 181.24
2015	54 658.84	61 170.95	NA	NA		–1 000.47	NA	–4 343.99

Note: Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

[a] Base year refers to the base year under the Kyoto Protocol, which is the average of the period 1985–1987 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs, SF_6 and NF_3. Hungary has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The Party has not reported indirect CO_2 emissions in CRF table 6.

[c] The value reported in this column refers to 1990.

[d] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely AR and deforestation.

Table 8
Greenhouse gas emissions by gas for Hungary, excluding land use, land-use change and forestry, average of years 1985–1987–2015
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
Average of years 1985–1987	85 564.64	12 543.60	11 019.95	NO	371.08	NO	6.15	NO
1990	73 447.85	11 746.22	8 315.21	NO	375.72	NO	10.89	NO
1995	61 607.78	8 812.05	4 741.74	51.49	222.72	NO	52.04	NO
2000	58 544.69	8 923.16	5 367.24	224.81	283.11	NO	84.04	NO
2010	52 217.01	8 067.39	3 808.79	1 291.67	1.52	NO	87.34	NO
2011	50 436.19	7 965.41	4 025.18	1 405.53	2.16	NO	74.18	NO
2012	46 884.00	8 011.20	3 985.85	1 267.81	1.72	NO	73.68	NO
2013	43 867.65	7 809.54	4 346.62	1 336.84	1.69	NO	93.90	NO
2014	44 034.38	7 702.95	4 224.18	1 865.81	1.45	NO	108.51	NO
2015	46 777.50	7 625.88	4 308.75	2 345.79	1.15	NO	111.88	NO
Per cent change Average of years 1985–1987 to 2015	**–45.3**	**–39.2**	**–60.9**	**NA**	**–99.7**	**NA**	**1 720.2**	**NA**

Note: Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.
[a] Hungary did not report indirect CO_2 emissions in CRF table 6.

Table 9
Greenhouse gas emissions by sector for Hungary, average of years 1985–1987 to 2015
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
Average of years 1985–1987	78 986.78	15 209.45	11 933.09	–1 807.92	3 376.11	NO
1990	68 197.29	11 831.84	9 975.64	–2 671.60	3 891.12	NO
1995	57 065.65	8 346.42	5 942.58	–5 699.43	4 133.18	NO
2000	54 663.46	8 293.37	6 100.63	–767.22	4 369.59	NO
2010	48 876.20	6 678.57	5 642.44	–4 551.87	4 276.51	NO
2011	47 024.42	6 795.26	5 881.38	–4 149.35	4 207.59	NO
2012	43 760.41	6 309.08	5 945.19	–4 863.60	4 209.59	NO
2013	41 324.95	5 766.54	6 340.13	–3 874.74	4 024.61	NO
2014	40 905.57	6 601.21	6 493.90	–5 361.21	3 936.59	NO
2015	43 274.77	7 381.21	6 676.35	–6 512.11	3 838.62	NO
Per cent change Average of years 1985–1987 to 2015	**–45.2**	**–51.5**	**–44.1**	**260.2**	**13.7**	**NA**

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions. (2) Hungary did not report indirect CO_2 emissions in CRF table 6.

Table 10
Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year[a]–2015, for Hungary
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	*Article 3.3 of the Kyoto Protocol*		*FM and elected Article 3.4 activities of the Kyoto Protocol*				
	Land-use change	*AR*	*Deforestation*	*FM*	*CM*	*GM*	*RV*	*WDR*
FMRL				–1 000.00				
Technical correction				–40.00				
Base year	NA				NA	NA	NA	NA
2013		–1 234.10	122.09	–1 534.90	NA	NA	NA	NA
2014		–1 070.32	150.29	–3 181.24	NA	NA	NA	NA
2015		–1 218.30	217.83	–4 343.99	NA	NA	NA	NA
Per cent change Base year–2015					**NA**	**NA**	**NA**	**NA**

Note: Values in this table include emissions on lands subject to natural disturbances, if applicable.

[a] Hungary has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column refers to 1990.

2. Table 11 provides information on the accounting quantities for reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 11

Accounting quantities for activities under Article 3, paragraph 3, and forest management and any elected activities under Article 3, paragraph 4, of the Kyoto Protocol, for Hungary

(kt CO_2 eq)

Greenhouse gas source and sink activities	*Base year*[a]	*Net emissions removals*				*Accounting parameters*	*Accounting quantity*[c]
		2013	*2014*	*2015*	*Total*[b]		
A.1. AR		–1 234.095	–1 070.323	–1 218.304	–3 522.722		–3 522.722
Excluded emissions from natural disturbances[d]		NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA		NA
A.2. Deforestation		122.088	150.286	217.834	490.208		490.208
B.1. FM					–9 060.132		–5 940.132
Net emissions/removals		–1 534.903	–3 181.237	–4 343.992	–9 060.132		
Excluded emissions from natural disturbances[d]		NA	NA	NA	NA		NA
Excluded subsequent removals from land subject to natural disturbances		NA	NA	NA	NA		NA
Any debits from CEF-ne		NO	NO	NO	NO		NO
FMRL[e]						–1 000.000	
Technical corrections to FMRL						–40.000	
FM cap						30 680.949	–5 940.132
B.2. CM (if elected)		NA	NA	NA	NA		NA
B.3. GM (if elected)		NA	NA	NA	NA		NA
B.4. RV (if elected)		NA	NA	NA	NA		NA
B.5. WDR (if elected)		NA	NA	NA	NA		NA

[a] Net emissions and removals from CM, GM, RV and/or WDR, if elected, in the Party's base year, as established by decision 9/CP.2.

[b] Cumulative net emissions and removals for all years of the commitment period reported in the current submission.

[c] The accounting quantity is the total quantity of units to be issued or cancelled for a particular activity.

[d] The Party has indicated it does not intend to exclude emissions from natural disturbances.

[e] FMRL as inscribed in the appendix of the annex to decision 2/CMP.7, in kt CO_2 eq per year.

3. Table 12 provides an overview of relevant key data for Hungary's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 12
Key relevant data for Hungary under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Key parameters	*Values*
Periodicity of accounting	(a) AR: annual accounting
	(b) Deforestation: annual accounting
	(c) FM: annual accounting
	(d) CM: not elected
	(e) GM: not elected
	(f) RV: not elected
	(g) WDR: not elected
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	No
3.5 % of total base-period GHG emissions, excluding LULUCF	3 835.119 kt CO_2 eq (30 680.949 kt CO_2 eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. AR in 2015	Issue 1 220 591 RMUs
2. Deforestation in 2015	Cancel 225 948 RMUs
3. FM in 2015	Issue 4 343 991 RMUs
4. CM in 2015	NA
5. GM in 2015	NA
6. RV in 2015	NA
7. WDR in 2015	NA

Annex II

Information to be included in the compilation and accounting database

Tables 13–15 include the information to be included in the compilation and accounting database for Hungary. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable), as well as the final data to be included in the compilation and accounting database.

Table 13
Information to be included in the compilation and accounting database for 2015, including on the commitment period reserve, for Hungary
($t CO_2 eq$)

	Original submission	*Revised estimates*	*Adjustment*	*Final*
CPR	391 037 652			391 037 652
Annex A emissions for 2015				
CO_2	46 777 502			46 777 502
CH_4	7 625 880			7 625 880
N_2O	4 308 749			4 308 749
HFCs	2 266 590	2 345 790		2 345 790
PFCs	1 149			1 149
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	111 879			111 879
NF_3	NO			NO
Total Annex A sources	**61 091 749**	**61 170 949**		**61 170 949**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015				
3.3 AR	–1 218 304			–1 218 304
3.3 Deforestation	217 834			217 834
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015				
3.4 FM	–4 343 992			–4 343 992

Table 14
Information to be included in the compilation and accounting database for 2014, for Hungary
($t CO_2$ eq)

	Original submission	*Revised estimates*	*Adjustment*	*Final*
Annex A emissions for 2014				
CO_2	44 034 377			44 034 377
CH_4	7 702 951			7 702 951
N_2O	4 224 180			4 224 180
HFCs	1 807 969	1 865 805		1 865 805
PFCs	1 453			1 453
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	108 506			108 506
NF_3	NO			NO
Total Annex A sources	**57 879 437**	**57 937 273**		**57 937 273**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 AR	–1 070 323			–1 070 323
3.3 Deforestation	150 286			150 286
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 FM	–3 181 237			–3 181 237

Table 15
Information to be included in the compilation and accounting database for 2013, for Hungary
($t CO_2$ eq)

	Original submission	*Revised estimates*	*Adjustment*	*Final*
Annex A emissions for 2013				
CO_2	43 867 650			43 867 650
CH_4	7 809 537			7 809 537
N_2O	4 346 617			4 346 617
HFCs	1 281 427	1 336 841		1 336 841
PFCs	1 691			1 691
Unspecified mix of HFCs and PFCs	NO			NO
SF_6	93 896			93 896
NF_3	NO			NO
Total Annex A sources	**57 400 818**	**57 456 232**		**57 456 232**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 AR	–1 234 095			–1 234 095
3.3 Deforestation	122 088			122 088
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 FM	–1 534 903			–1 534 903

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of reporting in the Party's inventory are the following:

(a) Indirect N_2O emissions from leaching and run-off relating to N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils for category 4(IV) indirect N_2O emissions from managed soils: (see ID# L.14 in table 6);

(b) N_2O emissions from N mineralization/immobilization due to carbon loss/gain associated with land-use conversions and management change in mineral soils (see ID# KL.6 in table 6).

Annex IV

Documents and information used during the review

A. Reference documents

Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/kpsg.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

Annual review reports

Reports on the individual review of the 2013, 2014, 2015 and 2016 annual submissions of Hungary, respectively, contained in documents FCCC/ARR/2013/HUN, FCCC/ARR/2014/HUN, FCCC/ARR/2015/HUN and FCCC/ARR/2016/HUN.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at http://unfccc.int/resource/webdocs/agi/2017.pdf.

Annual status report for Hungary for 2017. Available at http://unfccc.int/resource/docs/2017/asr/hun.pdf.

EEA. 2016. *EMEP/EEA air pollutant emission inventory Guidebook 2016*. Available at http://www.eea.europa.eu/publications/emep-eea-guidebook-2016.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Gábor Kis-Kovács (Hungarian Meteorological Service), including additional material on the methodology and assumptions used.